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THE COMMON MOLE.

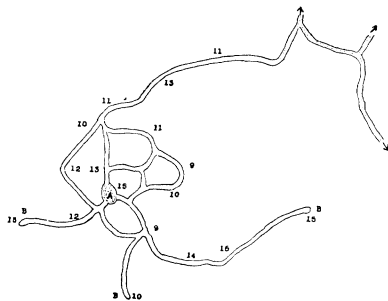
Runway Studies ; Hours of Activity.

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RUNWAY STUDIES.

THE central part of a mole's system of runways can usually be located by the little piles of earth thrust up from the deeper tunnels. These are easily distinguishable from any elevations of the surface ridging due to the mole's burrowing just beneath the sod. They may be looked for on the higher spots of an open field or where natural objects offer some concealment and shelter. There are no "mole hills" in this country, such as those referred to in discussions of the European mole. The deeper tunnels constitute the real living quarters of the mole, the surface ridges being merely the paths ranging over his hunting grounds.

I have at various times spent many hours in digging out mole runways in places that promised interesting results. In all I have thus excavated parts of six central systems and prepared several diagrams, one of which accompanies this paper. In mapping out the runway of any burrowing animal my plan for securing accuracy of detail is to divide all the ground covered by the excavation into small squares by stakes and cross lines. Corresponding squares, on a smaller scale, are then drawn on the sheets of paper to be used for the map.



Runways of the common mole.

The galleries and highways of the central system of a mole's habitation run at depths of from eight or ten inches in some places to twelve or fifteen in others, rarely deeper. In several instances, however, I have found the blind runs, or "bolt runs" as the English call them, descending to a depth of two feet or even more.

There can be no question but that these branches of the deep runway system actually end each in a cul-de-sac, for in nearly a dozen cases they were carefully followed with spade and trowel to an abrupt termination. Usually the blind end was slightly enlarged on one side of the axis, as though the burrowing animal had scooped out a little leeway for turning to right or left.

Occasionally at any point on the surface ridge a mole's burrow will drop down abruptly and follow along in the subsoil for several feet before reappearing again at the surface. This is probably a provision for escaping the attacks of an enemy above ground, as these retreats are often at points remote from the main central system.

In my excavations I have unearthed at least a half-dozen nests, each in a chamber four to six inches in diameter and about a foot beneath the surface of the ground. In all cases the nesting material consisted mainly of closely cropped pasture grasses with the fine fibrous roots attached. It is probable that this grass stubble had been pulled down by the roots into the shallow surface burrows and carried from those to the nesting chambers. That the mole seeks some material above ground for its nests, however, is evident from the fact that there was a large admixture of leaves in the only two nests that were near trees.

But two of the six nests discovered were in a condition to indicate that they might be in use at the time (late fall months). The others were somewhat dilapidated, mixed with earth and infested with vermin. It is likely that these were occupied when the young were being reared in the spring.

In sifting the material of these old nests, hundreds of small, light-brown beetles (*Leptinus testaceus*) were secured. Their larvæ were also very plentiful, and in addition the material yielded mites in all stages, and some fleas. Specimens of all these parasites were also found on some of the moles trapped during the fall.

There is little doubt but that the mole is strictly a hermit in its relations to others of its kind, particularly in the fall season of the year. During the progress of my excavations one mole, and only one, showed up in each case to make repairs in the ruined galleries. When this mole was caught the place always remained in a state of desolation for some days at least. In a field well populated by moles the intersection of branch runs belonging to different systems is inevitable. Sooner or later, therefore, almost

every spot where I have once captured a mole, by hand or by trap, has been visited by other moles and the deserted runways again occupied.

HOURS OF ACTIVITY.

It is commonly believed that moles work only at periods recurring regularly each day; that in the morning, at noon, and again in the evening the little animals are impelled by hunger to extend their surface runways in search of food. Between times they are supposed to sleep or rest quietly in their underground nests. It is possible that this idea may have gained popular credence through a course of reasoning from our own regularity of meal times. My observations go to show that during the fall season, at least, there is no stated time of day when the animal is more or less active than at other times. The results of these observations are given below.

It has been found that if a breach is made into the runway of a mole, the little animal will invariably repair the breach when he comes that way on his rounds. By taking advantage of this fact one can gain much information if he will visit, at short, regular intervals throughout the day, each of a circuit of runs in which a slight breach has been made. The following are the results of such an investigation :

Fifty runs were marked by stakes and a breach made in each as late in the evening as it was possible to see the marks. The first round of inspection was made between six and seven o'clock the next morning, and other rounds at intervals of one hour during that day and the following day. To the records of these two days were added those of two other nonconsecutive days, selected so as to include various kinds of weather

Number of places in which breaches were repaired during the night ...	135
Number of places in which repairs were made during the day.....	116
Breaks repaired in the forenoon	109
Breaks repaired in the afternoon	89
Breaks found repaired at—	
8 A. M.....	19
9 A. M.....	18
10 A. M.....	22
11 A. M.....	26
12 M.....	24
1 P. M.....	27
2 P. M.....	17
3 P. M.....	12
4 P. M.....	20
5 P. M.....	13

Another experiment, in which thirty-six runs were kept under observation, gives us the following results for a period of twenty-four hours, the original breaks having been made late in the evening:

Breaks found repaired at—

9-10 P. M.....	15
3- 4 A. M.....	16
9-10 A. M.....	9
1- 2 P. M.....	11
5- 6 P. M... ..	8

From a study of these figures it is very evident that the mole is not a creature of the periodical feeding habits commonly ascribed to him; moreover, that in his daily activities he may not be classed as diurnal, nocturnal, or crepuscular. To what extent, if any, he may vary from these observed habits in the summer season remains to be determined by further investigation.